REMARKS

Amendment to the claims

Applicants have amended claims 1, 15 and 25 to recite that the vessel is sealed to form a closed vessel and that the vessel includes a openable and closable outlet for discharge of vapor. Support for this terminology can be found in the specification at page 5, line 13 and page 10, line 28, respectively.

In the present Office Action, the Office cited a reference U.S. Patent No. 6,237, 529 and stated that the inventor was Van Slyke. However, the inventor of U.S. Patent No. 6,237, 529 is Spahn. Applicants reviewed all the issued patents to Van Slyke and none of them seemed appropriate, and as such, assume that the correct inventor and cited reference is Spahn.

Rejection of Claims and Transversal Thereof

In the June 10, 2005 Office Action:

claims 1-4, 6-8, 10, 12-14 and 25-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr (U.S. Patent No. 2,447,789, hereinafter Barr) in view of Spahn (U.S. Patent No. 6,237,529, hereinafter Spahn) and/or Greer, et al. (U.S. Patent No. 5,104,695, hereinafter Greer);

claims 2 and 9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Spahn and/or Greer in further view of Tanabe et al. (U.S. Patent Application Publication Number 2001/0008121, hereinafter Tanabe); and

claims 11 and 28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Spahn and/or Greer in further view of Holloway (U.S. Patent No. 3,647,197, hereinafter Holloway).

These rejections are hereby traversed in respect of the pending claims, as amended herein, and reconsideration of the patentability of these claims is therefore requested in light of the following remarks.

Rejections under 35 U.S.C. §103(a)

1. Claims 1-4, 6-8, 10, 12-14 and 25-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Spahn and/or Greer. Applicants submit that the proposed combinations do no in any way establish a *prima facie* case of obviousness.

Applicants' claim 1 recites the following:

> 1. A vaporizer comprising:
>
> a thermally conductive block comprising a top surface and bottom surface and a multiplicity of non-moving elongated wells formed therein for placement of a vapor source material, the multiplicity of elongated wells communicatively connected to an interior space within the thermally conductive block for accumulation of vapor, wherein each elongated well consists of a closed end and single opening that is in fluid communication with the interior space, and wherein each elongated well is vertically positioned relative to the top and bottom surface of the conductive block;
>
> a heating device for applying heat to the multiplicity of the elongated wells within the thermally conductive block;
>
> a removable sealing lid positioned on the top of the thermally conductive block for sealing the thermally conductive block **to form a closed vessel** and removable for ease of filling the elongated wells; and
>
> an **openable and closable** outlet for discharge of vapor formed in the vaporizer communicatively connected to the removable sealing lid and the interior space.

Importantly applicants' device includes a closable vessel with an outlet that is opened when vaporized source material has accumulated in the closed vessel in an amount sufficient to provide a continuous stream of source material to a downstream processing unit.

In contrast, none of the cited references provides such a closed vessel. Initially, reviewing each of the structures of Barr, Spahn and Greer, it is evident that none of the vessels has the structure or ability to be closed and sealed to retain varporized source material within the vessel or to adjust pressure within the vessel. As such, even if the references were combinable, which they are not, the proposed combinations still do not teach or suggest each of applicants' claimed elements.

For example, the Barr vessel shown in Figures 1 and 2, as recreated below for ease of discussion, does not provide for a closed vessel to retain the vaporized source material.

FIG. 1

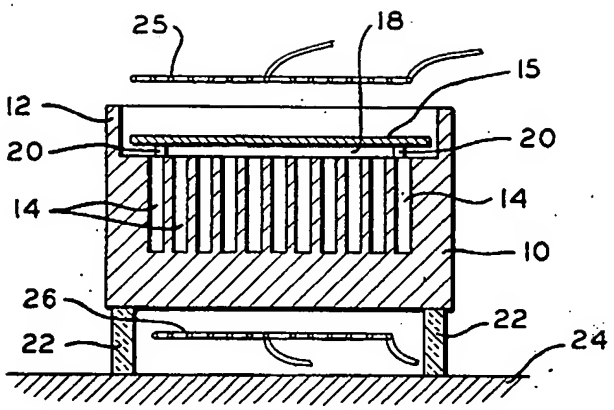


Figure 1 shows a vessel 10 with a multiplicity of wells 14. Postioned over the well is a plate 15 that is placed on four holders 20 so that the vaporized gas strikes plate 15 and traverse sideways in space 18 to the edges of plate 15 and escapes through the space 16 positioned between 12 and the edge of 15. Space 16 can be better viewed in Figure 2 of Barr recreated below.

FIG. 2

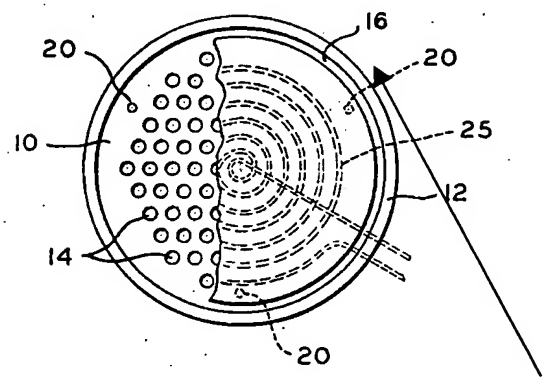


Plate 15 is preferable a solid plate but can also include a mesh that prevents the escape of particles.

Barr includes multiple heating elements placed above and below the vessel and also multiple wells to ensure that the entire charge of material is brought to evaporation temperature before appreciable vaporization begins (column 2, lines 52-54), thereby overcoming uneven heating or overheating of some of the material (top of column 3). Clearly, there is no structure in Barr that provides for a vessel having an openable and closable outlet.

Spahn suffers from the same shortcomings as Barr relating to a closable vessel. For example, Figures 1, 2 and 3 provide a structural depiction of the Spahn system.

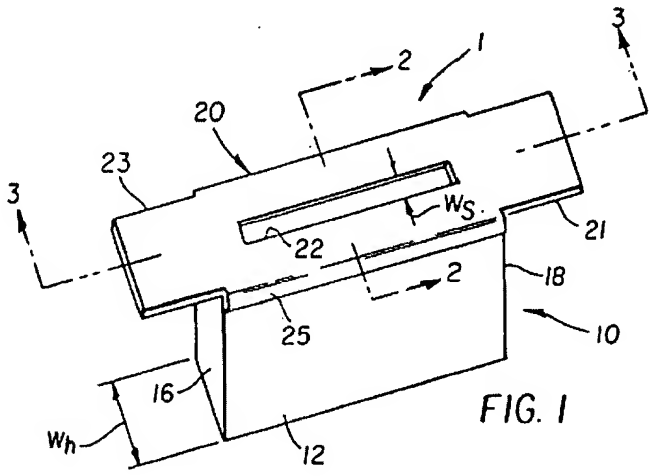


FIG. 1

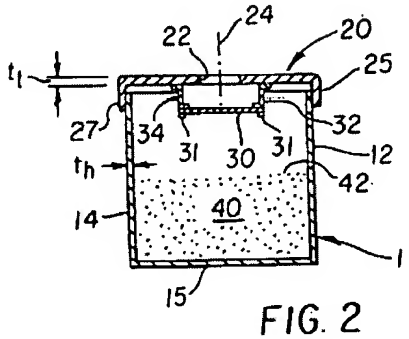


FIG. 2

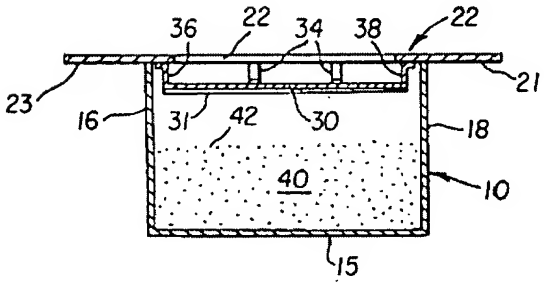
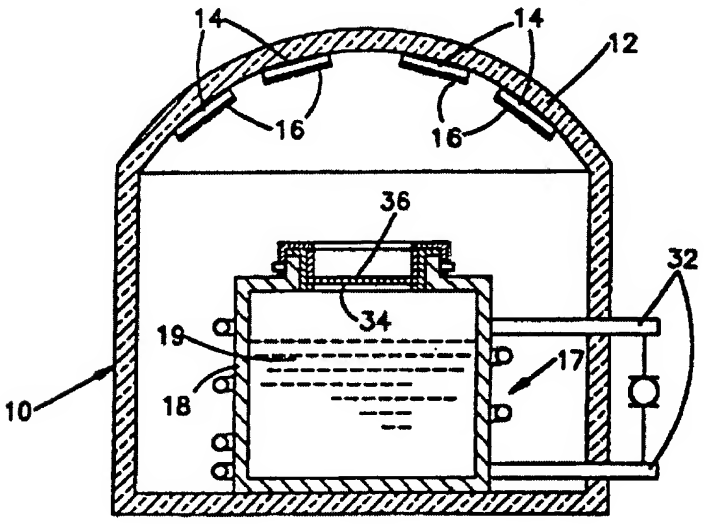


FIG. 3

Figure 1 shows an opening 22 that allows vaporized gas to escape from the vessel 10. However, before vaporized source material escapes from the single compartment vessel, the vaporized source material contacts baffle 30, which is positioned below plate 20, as shown in Figures 2 and 3. As stated in column 5, lines 21 to 25, the " baffle member 30 is positioned with respect to the vapor efflux

aperture 22 such that the baffle member 30 prevents particulates or droplets of the organic electroluminescent vapor deposition material 40 from being ejected through the aperture while permitting molecules of vaporizing organic electroluminescent material 40 to follow pathways within the housing 10 around the baffle member 30 for final exit through the vapor efflux aperture 22 in a direction toward the substrate." Thus, the single compartment vessel of Spahn provides an arduous path about the baffle 30 with a final exit at 22. Applicants have reviewed that Spahn specification and there is teaching or suggestion that the baffle 30 is constructed of screen material. Further, there is clearly no discussion regarding a structure that provides for closing and sealing this vessel. Instead, slot 22 is always open to allow the vaporized source material to deposit on substrates as shown in Figure 4.

Lastly, reviewing Greer, it is evident that the Greer structure does not provide, teach or suggest a structure that provides for an openable and closable system. Reviewing Figure 3, recreated below from Greer, it can be seen that vaporized source material is placed in a single compartment 17 with heating element 32 therearound and the vaporized source material passes through mesh 24 but only after it condenses on the bottom surface 34 and then is re-vaporized on the top surface 36 for subsequent deposition on substrates 16. Interestingly, Greer wants the material be absorbed into the multilayer mesh 24 so that it can be condensed and re-evaporated. Again, there is no openable or closable structure to maintain the vaporized source material within vessel 17.



As shown above, none of the three cited structures provides for a vessel that is openable and closable. Instead all of the cited vessels allow for a constant flow of vaporized source material without the

structural configuration for stopping such flow within a closable vessel. Further, there is no teaching or suggestion, in any of the references, alone or in combination to go in the direction of applicants. Further, the "mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification" *In re Mills*, 16 USPQ2d 1430 (Fed. Cir. 1990) quoting *In re Gordon* 221 USPQ 1125 (Fed. Cir. 1984). It is further stated by the *Mills* Court that "It is not pertinent whether the prior art possesses the functional characteristics of the claimed invention if the reference does not describe or suggest its structure." In light of current case law, and the fact that the cited references either alone or in combination do not recited each and every element of applicants' claimed invention, the proposed combinations do not defeat the patentability of the presently claimed invention.

According to the Office,

> "It would have been obvious to one skilled in the art to modify the vaporizer of Barr for use with particulate screening means of the type taught by Van Slyke [sic] and/or Greer, because Barr teaches that his vaporizer can be modified with other known particulate screening means, and because Van Slyke and Greer teach that a screening means in the form of a lid that is sealed to the top of the vaporizer container will successfully prevent particulates from escaping from the vaporizer."

Applicants vigorously disagree. Initially, it must be recognized that it is incumbent on the Office to view applicants' claimed invention as a whole. *In re Wesslau*, 174 U.S.P.Q. 393 (CCPA 1965). Concurrently, the Office must consider the inventions of any cited references in their respective entireties. Certain individual features from the references may not be arbitrarily chosen (while equally arbitrarily discarding other disclosed features) to merely lump together disparate features of different references as a mosaic in an attempt to meet the features of the rejected claims. Thus, the Office is not allowed to pick and choose just certain parts of different references and combine them, but instead, the references in **their entirety must be considered**.

As such, the teachings of Barr and Spahn/Greer must be viewed in their entirety. As stated above, the Barr system describes a crucible that comprises a body member including a multiplicity of cavities. The multiplicity of wells is important because Barr is very concerned about hot and cold spots and inconsistent heating of the source material. Barr further stresses that the radius of plate 15 is sufficiently smaller than that the inner radius of flange 12 to leave an annular space 16 therebetween. As such, the vaporized source material travels sideways along path 18 to escape via annular space 16. Notably the angular space is not screened.

In contrast, Spahn teaches a single compartment vessel. Although the escaping vaporized material escapes from the system similar to Barr, there is no discussion regarding sealing of the system because slot 22 is always opening similar to slot 16 of Barr. However, viewing these two systems, without the blueprint of applicants' disclosure, where is there any suggestion or teaching to go in the direction of applicants' claimed invention. Clearly there is none. Even if the multiple wells are included in the Spahn vessel, the combination would not teach each and every element of applicants' claimed invention.

Still further, applicants have included herewith a Declaration under 37 CFR §1.131 executed by the Matthew Donatucci (Appendix A). The Declaration attests to facts showing completion and possession of the vaporizer delivery system of the instant claimed invention prior to the effective date of the following reference cited in the June 10, 2005 Office Action against the claims previously pending in the application:

Reference	Effective Date
Spahn	March 3, 2000

The Declaration includes appended Exhibit 1.

Exhibit 1 is a copy of pages 1-5 of the Invention Disclosure Document on which all dates have been blacked out, but which dates, and the date of the Record of Invention, are prior to the effective date of the Spahn reference.

These pages evidence the inventors' conception of the present invention.

Page 1, in the first paragraph thereof, documents "[t]he internal reservoir is made up of many deep, cylindrical wells. The small cylindrical wells dramatically increase the surface area to contact the solid, therefore more decaborane is vaporized."

Page 1, in the second paragraph thereof, states "[t]he system also has to be heated evenly over its geometry in order to prevent decaborane from condensing in a 'cold' spot." Additionally, page 2, in the second paragraph thereof, discloses "[t]he reservoir block and shut off valve are heated by 10 watt resistors."

Page 2, in the top portion thereof, contains "[t]he lid and valve, which is one piece, is sealed to the block with a viton o-ring and machine screws."

Page 2, in the top paragraph thereof, discloses "[a]top the aluminum block is a shut off valve ...which provides good conductance for decaborane flow."

Thus, Exhibit 1, with the enclosed Declaration, provide proof of completion and possession of the vaporizer delivery system of the instant claimed invention comprising a thermally conductive block having a multiplicity of elongated wells, a means for applying heat to the multiplicity of elongated wells, a means for sealing the thermally conductive block, and an outlet for discharge of vapor formed in the vaporizer prior to the effective date of the Spahn reference.

As stated above, the Barr system provides for a plate 15 that directs the flow of vaporized material through a lateral flow space 18 and out of the vessel through angular space 16. Notably, there is no screen in the angular space 16. In contrast, Greer provides for a system wherein the vaporized source material is placed in a single compartment 17 with heating element there around 32 and the vaporized source material passes through mesh 24 but only after it condenses on the bottom surface 34 and then is re-vaporized on the top surface 36 for deposition on substrates 16. Interestingly, Greer wants the material be absorbed into the multilayer mesh 24 so that it can be condensed and re-evaporated. This meshing system is an important aspect of the Greer system.

Applicants submit that if the systems of the two references are combined, the Greer system will no longer function as intended. Keeping in mind that the Office is not allowed to pick and choose certain elements for different references to the exclusion of other elements. For instance, Greer would no longer function as intended if the entire vaporized source was not directed through meshing 24 for condensation and subsequent re-evaporation but instead some of the vaporized material bypassed the meshing and was allowed to pass through angular space 16 of Barr. Alternatively, the thick meshing described in Greer (column 3, lines 39 to 50) will not be acceptable in the Barr system because Barr specifically is concerned about large particles and if these large particles are caught in the meshing, the meshing will eventually clog and no longer function as described in Greer. Further, as stated numerous times, Barr states that "it is desirable that the entire charge of material be heated to the evaporation point before any evaporation begins and this is accomplished by using the multiple wells that are clearly not a part of the Greer system. Certainly, combining the references would defeat the purpose of at least the Greer reference. Notwithstanding the adverse outcome by the combination of

cited reference, the Office contends that this is exactly what one skilled in the art would do. However, according to the court in *In re Gordon,* 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984), if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

In light of the above discussion showing that the references alone or in combination do not teach or suggest the presently claimed invention and that if combined the Greer system would no longer function as intended, applicants respectfully request the withdrawal of the rejection of claims 1-4, 6-8, 10, 12-14 and 25-26 under §103(a) be withdrawn.

2. Claims 2 and 9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Spahn and/or Greer in further view of Tanabe. Applicants traverse such rejection and reiterate that the proposed combination of Barr in view of Spahn/Greer does not teach or suggest applicants' claimed invention and that the addition of Tanabe does not cure the deficiencies in the Office's proposed combinations.

According to the Office, Tanabe describes the use of a thermocoupling to measure the temperature of a vaporizer for feedback control of the vaporizer temperature. The Office further states that it would have been obvious to one skilled in the art to use a thermocouple in the temperature controller of Barr in view of Spahn/Greer, in view of Tanabe's teaching that a vaporizer temperature can be successfully controlled using a thermocouple. Applicants disagree and submit that the proposed combination does not describe, teach or in any way suggest all the required elements of applicants' claimed invention.

Specifically, Tanabe does not describe, teach or suggest a system that has the capacity for retaining the vaporized source material in a closed vessel with an actuatable output for allowing the release of the vaporized source material to a downstream processing unit. Introducing the teachings of Tanabe does not cure the deficiencies of Barr and Spahn/Greer. As such, applicants request that the rejection of claims 2 and 9 under 35 U.S.C. §103(a) be withdrawn.

3. Claims 11 and 28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Spahn/Greer and in further view of Holloway. According to the Office, "it would have been prima facie obvious to one skilled in the art to use this material for the thermally conductive vaporizer of Barr, Spahn and/or Greer, because Holloway teaches that aluminum can successfully be used to construct a vaporizer that requires thermal conductivity." As mentioned above, applicants have shown

that Barr in light of Spahn/Greer does not render applicants' claimed invention as obvious for multiple reasons. As such, the introduction of using aluminum from Holloway as the material of construction for a thermally conductive vaporizer does not overcome the deficiencies of the Barr and Spahn/Greer combinations. Accordingly, applicants respectfully request the withdrawal of the rejection of claims 11 and 28 under 35 U.S.C. §103(a).

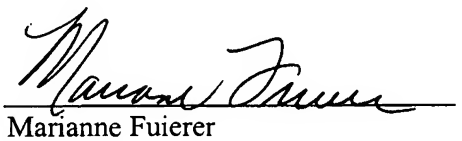
Rejoining of Method Claims

In accordance with MPEP §821.04, applicants, request the Office to take up the non-elected method of use claims 15-24 for examination when the apparatus claims are allowed. Consistent with such intent to rejoin, applicants have amended the method claims, notwithstanding the Office's withdrawal of such claims, to present them in form suitable for future examination upon allowance of elected claims.

CONCLUSION

Applicants have satisfied the requirements for patentability. All pending claims are free of the art and fully comply with the requirements of 35 U.S.C. §102 and §103. It therefore is requested that Examiner Bueker reconsider the patentability of the pending claims in light of the distinguishing remarks herein, and withdraw all rejections, thereby placing the application in condition for allowance. Notice of the same is earnestly solicited. In the event that any issues remain, Examiner Bueker is requested to contact the undersigned attorney at (919) 419-9350 to resolve same.

Respectfully submitted,



Marianne Fuierer
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Research Triangle Park, NC 27709
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re United States Patent Application of:		Docket No.:	2771-514
Applicant:	DONATUCCI et al.	Examiner:	BUEKER, Richard R.
Application No.:	10/022,298	Art Unit:	1763
Date Filed:	December 18, 2001	Confirm. No.:	1697
Title:	DECABORANE DELIVERY SYSTEM	Customer No.:	25559

DECLARATION UNDER 37 CFR §1.131 IN U.S. PATENT APPLICATION NO. 10/022,298

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

MATTHEW B. DONATUCCI hereby declare:

1. THAT I am a co-inventors of the subject matter disclosed and claimed in United States Patent Application No. 10/022,298 filed December 18, 2001 in the United States Patent and Trademark Office in the names of Matthew B. Donatucci, Luping Wang, James J. Mayer and entitled, "DECABORANE DELIVERY SYSTEM," hereafter referred to as the "Application."

2. THAT the Application discloses and claims a system for a vaporizer and delivery system having multiple elongated wells to provide increased surface area for vaporization of liquids and solid materials used in ion implantation and chemical vapor deposition processes, and that the Application broadly claims such a system in the following claim 1:

> 1. A vaporizer comprising:
>
> a thermally conductive block comprising a top surface and bottom surface and a multiplicity of non-moving elongated wells formed

therein for placement of a vapor source material, the multiplicity of elongated wells communicatively connected to an interior space within the thermally conductive block for accumulation of vapor, wherein each elongated well consists of a closed end and single opening that is in fluid communication with the interior space, and wherein each elongated well is vertically positioned relative to the top and bottom surface of the conductive block;

a heating device for applying heat to the multiplicity of the elongated wells within the thermally conductive block;

a removable sealing lid positioned on the top of the thermally conductive block for sealing the thermally conductive block to form a closed vessel and removable for ease of filling the elongated wells; and

an openable and closable outlet for discharge of vapor formed in the vaporizer communicatively connected to the removable sealing lid and the interior space.

3. THAT I am aware that the Application has been examined by the United States Patent and Trademark Office, that I have read the June 10, 2005 Office Action issued by the United States Patent and Trademark Office, and that I am aware that the claims of the Application have been rejected on various grounds including the disclosure of Spahn, U.S. Patent No. 6.237,529 which has an effective filing date of March 3, 2000.

4. THAT attached in Exhibit 1 hereof is a true and exact copy of pages 1-5 of an Invention Disclosure Document, on which all dates have been blacked out, but which dates are prior to the Effective Date; that the title of the document is "Decaborane Delivery System;" that page 1, first paragraph, fourth sentence discusses the "[t]he internal reservoir is made up of many deep, cylindrical wells. The small cylindrical wells dramatically increase the surface area to contact the solid, therefore more decaborane is vaporized.;" that page 1, middle paragraph discusses "[t]he system also has to be heated evenly over its geometry in order to prevent decaborane from condensing in a 'cold' spot;" that page 2, top paragraph discusses "[t]he lid and valve, which is one piece, is sealed to the block with a viton o-ring and machine screws;" and that on page 2, top paragraph discusses "[a]top the aluminum block is a shut off valve...which provides good conductance for decaborane flow."

5. THAT I offer Exhibit 1 with this Declaration as evidence of the completion and possession of the integrated treatment system disclosed and claimed in the Application prior to the Effective Date identified in Paragraph 3 of this Declaration.

As a below-named declarant, I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements, and the like, so made are punishable by fine or imprisonment, or both, under Section 1001 or Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

MATTHEW B. DONATUCCI

Date 8/9/05

INVENTION DISCLOSURE

ROI Number [redacted]

Short, Descriptive Title: Decaborane Delivery System

(1) State the PROBLEM or DEFICIENCY which is overcome by your invention:
Decaborane is a solid with a vapor pressure of ~0.2 torr at room temperature. To increase the vapor pressure, heat must be supplied to its container. The evaporation rate of the decaborane in the vaporizer is significantly enhanced by its internal geometry. The internal reservoir is made up of many deep, cylindrical wells. The small cylindrical wells dramatically increase the surface area to contact the solid, therefore more decaborane is vaporized.

(2) Describe clearly the INVENTION, RESULTS, ADVANTAGES. (Make DRAWINGS when possible and DESCRIBE FULLY the invention and its OPERATION using REFERENCE NUMERALS to indicate elements.

A system was needed to provide a constant deliverable flowrate of decaborane to an ion source chamber. Decaborane is a white solid with a vapor pressure of ~0.2 torr at 20°C. The system has to be heated in order to generate enough vapor to induce flow to the source chamber. The system also has to be heated evenly over its geometry in order to prevent decaborane from condensing in a "cold" spot. All lines leading from the delivery system to the ion source chamber must also be heat traced for the same reason.

The system hardware is comprised of an aluminum block 2.5" W x 2.5" L x 5" H with a total internal volume of ~160 cc. The solid holding wells consist of 3/16" ID holes bored into the block and their total volume is ~60 cc. The remaining 100 cc is

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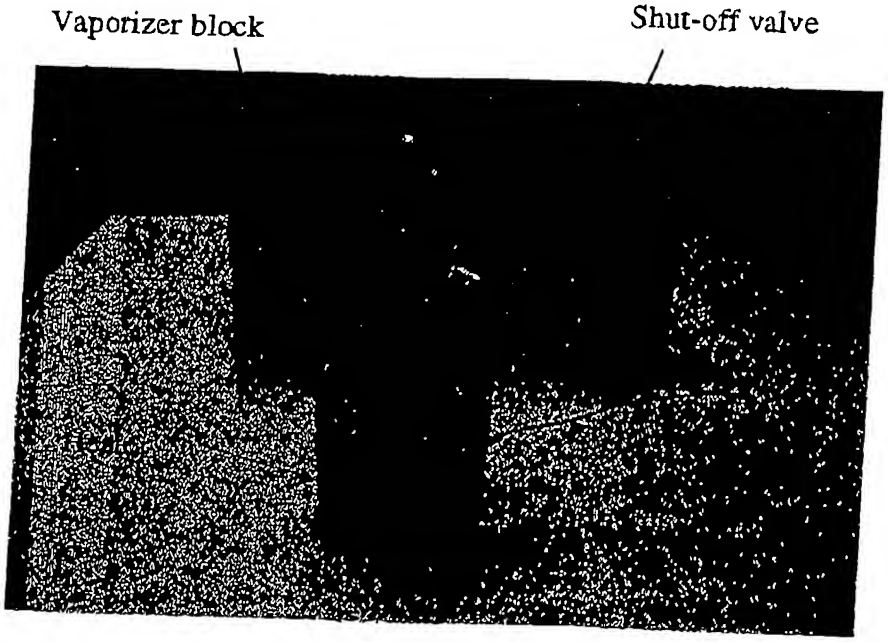
INVENTOR(S):

Matt Doctor (Signature)	(Signature)	(Signature)
Matt Doctor (Print Name)	(Print Name)	(Print Name)
[redacted] (Date)	(Date)	(Date)

READ AND UNDERSTOOD BY:

(Signature - Full Name)	(Signature - Full Name)
Oliver Tizman (Print or Type Full Name)	(Print or Type Full Name)
[redacted] (Date)	(Date)

bored out above the reservoirs and serves as a void space for the solid vapor to accumulate. Atop the aluminum block is a shut-off valve and block lid. The stainless steel shut-off valve has a 7.6 mm orifice which provides good conductance for decaborane flow. The lid and valve, which is one piece, is sealed to the block with a viton o-ring and machine screws. A picture of the hardware is shown below.



The reservoir block and shut-off valve are heated by 10 watt resistors. Four resistors are placed an each vertical face of the block and two are placed on the side of the valve block. When current is supplied to the resistors, they heat up and increase the temperature of the vaporizer and valve. The aluminum vaporizer provides excellent thermal conductivity and therefore a uniform temperature profile throughout. The temperature of the vaporizer can be controlled with a temperature controller, 50 watt power supply (2 amp max current) and a solid state relay. A wiring diagram is shown below:

INVENTOR(S):

Matt Dorfman
(Signature)
Matt Dorfman
(Print Name)
[redacted]
(Date)

(Signature)
(Print Name)
(Date)

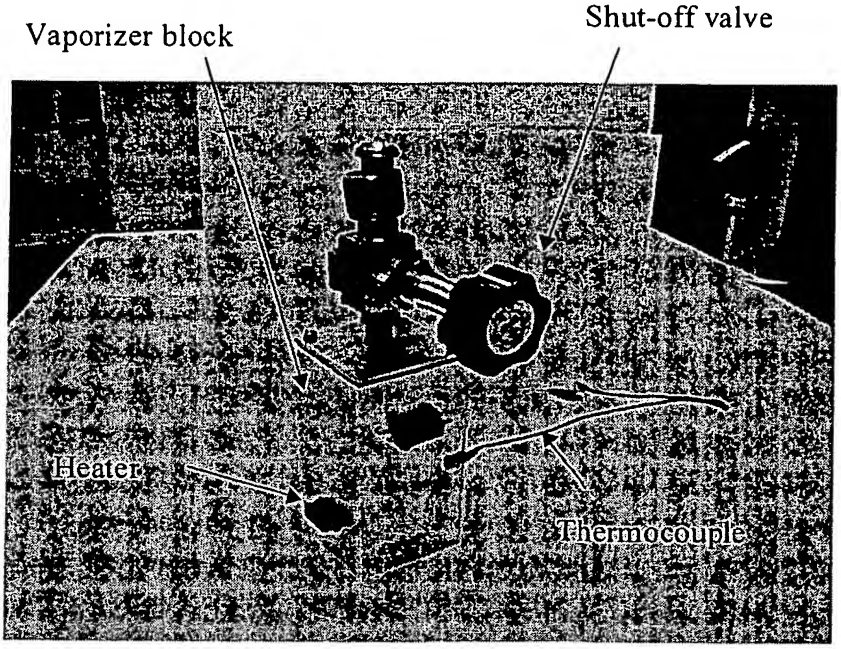
(Signature)
(Print Name)
(Date)

READ AND UNDERSTOOD BY:

(Signature - Full Name)
(Print or Type Full Name)
[redacted]
(Date)

(Signature - Full Name)
(Print or Type Full Name)
(Date)

bored out above the reservoirs and serves as a void space for the solid vapor to accumulate. Atop the aluminum block is a shut-off valve and block lid. The stainless steel shut-off valve has a 7.6 mm orifice which provides good conductance for decaborane flow. The lid and valve, which is one piece, is sealed to the block with a viton o-ring and machine screws. A picture of the hardware is shown below.



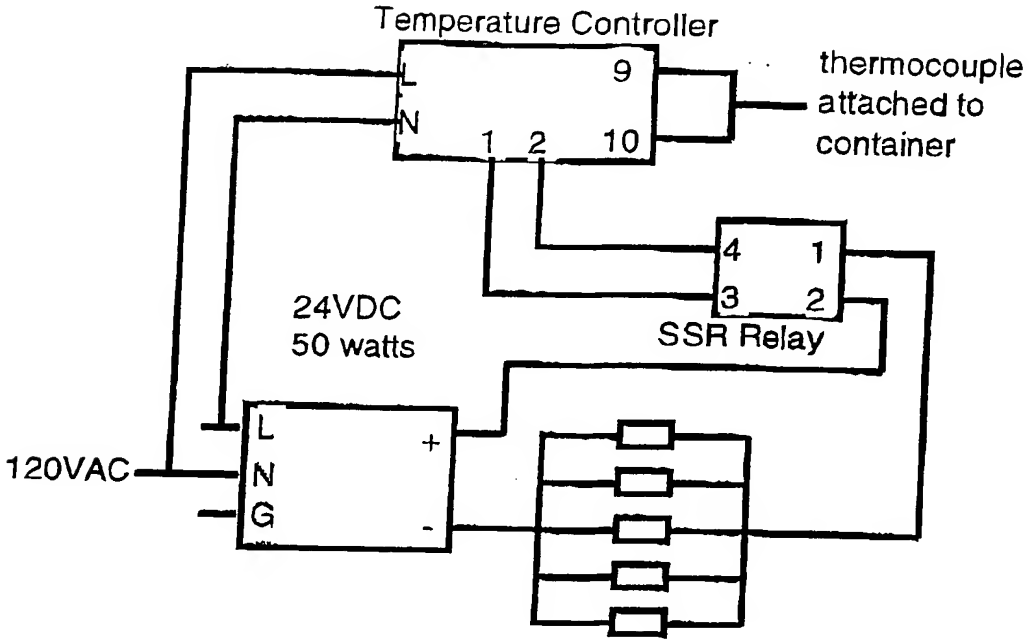
The reservoir block and shut-off valve are heated by 10 watt resistors. Four resistors are placed an each vertical face of the block and two are placed on the side of the valve block. When current is supplied to the resistors, they heat up and increase the temperature of the vaporizer and valve. The aluminum vaporizer provides excellent thermal conductivity and therefore a uniform temperature profile throughout. The temperature of the vaporizer can be controlled with a temperature controller, 50 watt power supply (2 amp max current) and a solid state relay. A wiring diagram is shown below:

INVENTOR(S):

(Signature)	(Signature)	(Signature)
(Print Name)	(Print Name)	(Print Name)
(Date)	(Date)	(Date)

READ AND UNDERSTOOD BY:

(Signature - Full Name)	(Signature - Full Name)
(Print or Type Full Name)	(Print or Type Full Name)
(Date)	(Date)



10 Watt resistors attached to container

Depending on the desired temperature, the temperature controller sends a signal to the power supply, through the relay, to either provide more current to the resistors or to power down the resistors. A surface mount type K thermocouple is connected to one of the vertical faces of the block. The maximum external temperature of the resistors is ~120°C with a 2 amp max current power supply.

Once testing is over, it is important to continue to supply power to the resistors on the shutoff valve and to cut power to the resistors on the vaporizer block. This will prevent the decaborane from condensing in and clogging the inlet to the shut-off valve. The decaborane vapor will instead re-condense in the cooler vaporizer block.

INVENTOR(S):

Matt Dorfman
(Signature)
Matt Dorfman
(Print Name)
[redacted]
(Date)

(Signature)
(Print Name)
(Date)

(Signature)
(Print Name)
(Date)

READ AND UNDERSTOOD BY:

(Signature - Full Name)
(Print or Type Full Name)
[redacted]
(Date)

(Signature - Full Name)
(Print or Type Full Name)
(Date)

Test data shows that sustainable flowrates of decaborane can be achieved with this system. Tests were conducted using various system temperatures and various orifice diameters. The maximum achievable flowrates are as follows (all temperatures reflect that of the vaporizer):

Through 1/4" OD straight tubing:
@42 C - 0.6 sccm
@52 C - 2.8 sccm
@66 C - 5.1 sccm

Through 1/8" OD straight tubing
@42 C - 0.1 sccm
@52 C - 0.8 sccm
@66 C - 3.6 sccm

Using a Needle valve
@66 C - 0.35 sccm (Cv = 0.004)
@66 C - 4.0 sccm (Cv = 0.055)

(3) Was this invention first conceived or first actually reduced to practice under government contract support? If so, what are the contract name and contract number?

No

(4) Has there been any publication, public disclosure, or offer for sale, or are any contemplated? Provide details, especially dates.

There is a plan to offer this product for sale as soon as possible. We have sent a prototype to Eat[redacted] testing and are going to send another to NJIT (by

INVENTOR(S):

(Signature)	(Signature)	(Signature)
(Print Name)	(Print Name)	(Print Name)
(Date)	(Date)	(Date)

READ AND UNDERSTOOD BY:

(Signature - Full Name)	(Signature - Full Name)	
(Print or Type Full Name)	(Print or Type Full Name)	
(Date)	(Date)	

end of the month). A small presentation regarding this product is planned for next months ion implant users group meeting. A brochure to introduce this product is currently in the design stage.

(5) Laboratory Notebook or Runsheet Number cross reference, including date(s).

Laboratory notebook [redacted] s all decaborane research starting on [redacted]

INVENTOR(S):

(Signature)	(Signature)	(Signature)
(Print Name)	(Print Name)	(Print Name)
(Date)	(Date)	(Date)

READ AND UNDERSTOOD BY:

(Signature - Full Name)	(Signature - Full Name)	
(Print or Type Full Name)	(Print or Type Full Name)	
(Date)	(Date)	